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TITLE

The types and effects of feedback received by emergency ambulance staff: Protocol for a systematic mixed studies review with narrative synthesis

ABSTRACT

Introduction: The application and effects of feedback for healthcare professionals, to support improved practice, is well-researched within the wider healthcare domain. Within a prehospital context, research into feedback has been developing in specific areas such as automated feedback from defibrillators and debrief after simulation. However, to date there has been no systematic review published on the types and effects of feedback available to emergency ambulance staff.

Aim: The primary aim of this systematic review is to identify, describe and synthesize the published literature on the types and effects of feedback received by emergency ambulance staff. The secondary aim will be to describe the mechanisms and moderators of the effects of prehospital feedback in an organisational context.

Methods: This study will be a systematic mixed studies review including empirical primary research of qualitative, quantitative and mixed-methods methodology published in peer-reviewed journals in English. Studies will be included if they explore the concept of feedback as defined in this review i.e. the systematised provision of information to emergency ambulance staff regarding their performance within prehospital practice and/or patient outcomes. The search strategy will consist of three facets: ambulance staff synonyms, feedback synonyms and feedback content. The databases to be searched from inception are MEDLINE, EMBASE, AMED, PsycInfo, HMIC, CINAHL and Web of Science. Study quality will be appraised using the Mixed Methods Appraisal Tool developed by Hong *et al.* (2018). Data analysis will consist of narrative synthesis guided by Popay *et al.* (2006) following a parallel-results convergent synthesis design.

Registration: PROSPERO (CRD42020162600)

BACKGROUND

Clinical Context

Prehospital care has traditionally involved rapid transportation of patients to the nearest Emergency Department (ED). However, in the United Kingdom (UK) significant changes have been made within ambulance services in response to the Bradley Report (Department of Health, 2005) and its update (Department of Health, 2011), as well as the Carter Report (NHS Improvement, 2018). This has resulted in paramedics routinely assessing and treating patients at home, referring them via alternative community pathways or bypassing local hospitals in favour of superior treatment in specialised centres. These developments are mirrored in emergency operations centres, where an increased emphasis has been placed on 'hear-and-treat' involving clinically-qualified advisors conducting in-depth assessments of patients over the phone (NHS Improvement, 2018; Department of Health, 2011)

Alongside the changing ambulance service landscape, an ageing patient population has led to an increase in the volume of callouts for low to mid-acuity patients, particularly for elderly patients with complex comorbidities and chronic conditions (Booker *et al.*, 2015). Front-line ambulance clinicians must often make difficult decisions as to whether or not to convey a patient to hospital, balancing the risks to the patient associated with non-conveyance, with the pressure to maintain the availability of critically-limited resources, whilst maintaining a patient-centred perspective (O'Hara *et al.*, 2015). These difficult decisions are similarly faced by prehospital staff undertaking call taking and dispatching, with the added complexity that triage decisions are being undertaken over the phone without the benefit of seeing the patient (O'Cathain *et al.*, 2018)

The result of these developments is that paramedics are increasingly making important patient management decisions and spending more time with patients during detailed assessments conducted either face-to-face or over the phone. Consequently, paramedics feel more involved in patient care and have greater interest in knowing whether their clinical decisions were correct, defined by Van Dreven and Williams (2011, p. 100) as "clinical curiosity". Enhancing feedback to paramedics in these situations may have considerable benefits for professional practice and patient safety, through supporting professional learning and prehospital decision-making. Indeed, when encountering particularly difficult or unique cases, paramedics often informally follow-up on patients by contacting ED staff (Jenkinson *et al.*, 2009). This phenomenon has been captured in a recent qualitative study conducted in the United Kingdom, which highlighted the lack of feedback that UK paramedics receive on patient outcomes and suggested the implementation of formal outcome feedback mechanisms (Eaton-Williams *et al.*, 2020b). Prehospital outcome feedback is referred to within the Paramedic Evidence-Based Education Project, which was commissioned by the Department of Health, England, and suggests a need to improve "the process by which […] paramedics receive timely feedback for clinical decisions" (Lovegrove and Davis, 2013, p. 10). In addition, the regulating body for paramedics in the UK – the Health and Care Professions Council (2014) – mentions that paramedics should monitor and evaluate the quality of their practice for quality assurance and improvement, which could be achieved through performance feedback.

Beyond the UK context, prehospital feedback has begun to receive attention in research originating in the health systems of other countries. In the US, Cash *et al.* (2017) found that only half of providers received feedback on their medical care provision within a thirty day period and a third of providers did not receive any type of feedback at all. A qualitative investigation of the provision of feedback to paramedics in Canada suggested that despite positive perceptions of the value of clinical outcome feedback, current systems lacked structure, objectivity and routine implementation (Morrison *et al.*, 2017). Both the studies by Cash *et al.* (2017) and Morrison *et al.* (2017) conclude that further research is needed to explore the content of feedback by ambulance service staff and how this feedback impacts on practice.

Whilst a growing body of research highlights the potential benefits of performance and outcome feedback for professional education and improved practice, there is evidence within the wider health services research literature to suggest that receiving feedback may enhance mental health (Michie and Williams, 2003) and even motivation and job-satisfaction (Morrison *et al.*, 2017). This is especially relevant in light of a recent systematic review indicating that mental health disorders amongst ambulance staff are more prevalent than in the general population: 11% for post-traumatic stress disorder, 15% for depression and 15% for anxiety (Petrie *et al.*, 2018).

Defining Feedback

There are many common uses of the term "feedback" both within and beyond the health services research literature, so it becomes important to define exactly what we mean by feedback within the context of the present study protocol. The term 'feedback' is most often used to describe the act of providing knowledge of the results of behaviour or performance to the individual (Archer, 2010). Within the psychological literature feedback interventions have been defined as "actions taken by [an] external agent(s) to provide information regarding some aspect(s) of one's task performance" (Kluger and Denisi, 1996, p. 255). Within the healthcare setting, audit and feedback is defined within the Implementation Science literature as: "any summary of clinical performance over a specified time period" (Jamtvedt *et al.*, 2006, p. 433). More recently, research into feedback-based interventions has focused on feedback as a process rather than simple transmission of a piece of information. Clinical Performance Feedback Intervention Theory encompasses "the entire process of selecting a clinical topic on which to improve, collecting and analysing population-level data, producing and delivering a quantitative summary of clinical performance, and making subsequent changes to clinical practice" (Brown *et al.*, 2019).

Given the diversity of research and theory relevant to feedback for healthcare professionals, in the proposed review we have adopted a broad view of feedback. Our working definition of the concept of prehospital feedback is: 'the systematised provision of information to frontline ambulance staff regarding their performance within prehospital practice and/or patient outcomes'.

Previous Research

Within the wider healthcare context, the Cochrane Collaboration regularly conducts systematic reviews on the effects of audit and feedback (Ivers *et al.*, 2012; Jamtvedt *et al.*, 2006). Although these reviews did not specifically exclude prehospital studies, the results do not include any studies within the prehospital setting, due to a focus on randomised trials and exclusion of other research designs and sources of evidence. The most recent update to the Cochrane Systematic Review suggests that feedback results in generally small to moderate positive improvements in patient care; whereby, feedback seems most effective when delivered by a supervisor or respected colleague, presented frequently verbally and in writing, features specific goals and action-plans, aims to decrease targeted behaviour and where baseline performance is low (Ivers *et al.*, 2012). The main findings from Ivers *et al.* (2012) and related systematic reviews are summarized in Table 1 (below).

Table 1: Main Findings from previous Systematic Reviews that synthesise the evidence for Feedback Effectiveness across multiple clinical practice settings

Author (Year)	Contribution
Hysong (2009)	• Audit and feedback has a modest, though significant positive effect on quality outcomes • Feedback seems more effective when: delivered frequently, in writing and with specific suggestions for improvement
de Vos *et al.* (2009)	• Feedback seems most effective when: given in combination with an education implementation strategy and/or the development of a quality improvement plan
van Der Veer *et al.* (2010)	• Factors influencing feedback effectiveness: (trust in) quality of the data, motivation of the recipients, organisational factors and feedback recipients' outcome expectancy
Ivers *et al.* (2012)	• Audit and feedback generally leads to small but potentially important improvements in professional practice • Feedback seems most effective when: delivered by a supervisor or respected colleague, presented frequently verbally and in writing, featuring specific goals and action-plans, aiming to decrease targeted behaviour, baseline performance is lower and recipients are non-physicians
Brehaut *et al.* (2016)	• 15 suggestions for optimising practice feedback interventions covering the nature of the desired action and available data, as well as feedback display and delivery
Brown *et al.* (2019)	• Healthcare professionals' and organisations' capacity to engage with feedback is limited • How they interact with feedback is shaped by their opinions of how patient care should be provided • Feedback is most effective when directly supporting clinical behaviours

Within prehospital care, research into feedback and its effects has been more focused in specific application areas. A recent literature review by Eaton-Williams *et al.* (2020a) summarized the published literature to date on the provision of clinical feedback to ambulance practitioners in March 2018. 15 studies were reviewed using narrative synthesis and the authors presented findings for four themes: effectiveness of feedback provision, barriers to effective feedback delivery, facilitators of effective feedback and desire for feedback. Overall, the authors concluded that feedback mechanisms improve ambulance practitioners' clinical performance and suggest that further research is required to evaluate the effects of clinical feedback to ambulance clinicians on clinical development, staff wellbeing and patient outcomes.

Rationale for a systematic mixed studies review

The current systematic review protocol set out in this article builds upon the review by Eaton-Williams et al. (2020a) using systematic review methodology, including the use of pre-defined review aims, formalised inclusion/exclusion criteria, interrater reliability checks, prior publication of a review protocol and following published guidance on the conduct of narrative synthesis (Lizarondo *et al.*, 2017; Pluye *et al.*, 2016; Popay *et al.*, 2006). We propose to extend the aim of our systematic review to not only summarize the provision of feedback, but to synthesise existing evaluative evidence and critically evaluate the available literature in this area using assessment of methodological quality.

Our rationale for a further review is to overcome the limitation identified by Eaton-Williams *et al.* (2020a) that potentially not all relevant articles were retrieved using the reported search strategy, by designing a more sensitive and comprehensive systematic search algorithm and applying it in a wider range of electronic databases. The search terms will additionally draw upon those used in the Cochrane Systematic Review of Audit and Feedback effectiveness within the Implementation Science literature (Ivers *et al.*, 2012). The systematic review will include ambulance staff situated within the emergency operations centre such as call takers and dispatch staff, who were specifically excluded within the literature review by Eaton-Williams *et al.* (2020a).

Our proposal is timely and addresses a clear gap in existing evidence syntheses which tend to focus upon provision of performance information linked to specific areas of practice. For example, there is a growing body of research on automated audio-visual feedback provided by defibrillators utilised during cardiopulmonary resuscitation. Systematic reviews by Yeung *et al.* (2009) and An *et al.* (2019), as well as meta-analyses by Kirkbright *et al.* (2014) and Wang *et al.* (2020), already synthesise the evaluative evidence in this area, demonstrating that audio-visual feedback during resuscitation can result in better adherence to recommended chest compression rate and depth, as well as improved patient outcomes depending on the type of device used.

The literature on feedback from automatic external defibrillators only addresses one very specific method of providing feedback and focuses solely on quality of care outcomes such as adherence to recommended chest compression rate and depth. This evidence does not address wider outcomes such as staff wellbeing or professional development. Furthermore, several

systematic reviews focusing on feedback within simulation have already been conducted and include studies involving paramedics such as debriefing after simulation training in healthcare (Garden *et al.*, 2015; Levett-Jones and Lapkin, 2014), simulation in cardiac arrest resuscitation (Sahu and Lata, 2010; Mundell *et al.*, 2013) and simulation in prehospital care (Abelsson *et al.*, 2014). Our proposed review will focus on feedback within a work experience context and a wider spectrum of prehospital feedback interventions. It will therefore exclude studies that are situated within a medical education context characterised by the source of data being simulated and the feedback being administered within a training programme outside of normal practice.

In summary of the current status of the research literature in this area, relevant research for effective feedback for prehospital clinicians is not currently well-defined within the evidence base or synthesised in a way that might guide practice or intervention. This may be due to a number of factors, including limited research evidence, diversity in study designs, lack of common terminology and definitions, lack of a coherent theoretical base underpinning current interventions and/or fragmentation of the relevant literature across multiple domains. There is a clear need to address this gap and explore these issues through systematic review and evidence synthesis.

Aim and Review Questions

The primary aim of this systematic review is to identify, describe and synthesize the published literature on the types and effects of feedback currently received by emergency ambulance staff as reported within the health service research literature. The secondary aim will be to describe the mechanisms and moderators of those effects resulting from the organisational or service context in which the feedback takes place. The findings will serve as a basis for developing future prehospital feedback interventions.

To this end, the proposed systematic review will seek to answer the following questions:

I. What are the main types and design elements of feedback interventions in prehospital care?
II. What are the measured effects of prehospital feedback interventions overall on staff wellbeing, quality and safety of patient care, professional development, clinical decision-making and other clinically relevant outcomes reported in the literature?
III. How do emergency ambulance staff perceive current feedback provision and factors shaping the implementation of feedback interventions in the prehospital setting?
IV. What are the moderators and key contextual factors (e.g. barriers, facilitators, opportunities) for effective prehospital feedback interventions reported in the literature?

METHODS

This protocol was structured according to the Preferred Reporting Items for Systematic reviews and Meta-Analyses Protocols statement (PRISMA-P) (Moher *et al.*, 2015; Shamseer *et al.*,

2015) and the adapted PRISMA for reporting systematic review of qualitative and quantitative evidence (Pluye *et al.*, 2016). Guidance was also sought from relevant sections of the Enhancing Transparency in Reporting the Synthesis of Qualitative Research (ENTREQ) statement (Tong *et al.*, 2012) and the Synthesis without meta-analysis (SWiM) reporting guideline (Campbell *et al.*, 2020).

The study design was informed by an online toolkit for mixed studies reviews created by Pluye *et al.* (2016), the Joanna Briggs Institute Reviewers Manual for Mixed methods systematic reviews (Lizarondo *et al.*, 2017) and guidance from Popay *et al.* (2006) on the conduct of narrative synthesis in systematic reviews. An illustrated version of the steps planned in this systematic mixed studies review can be found in Figure 1.

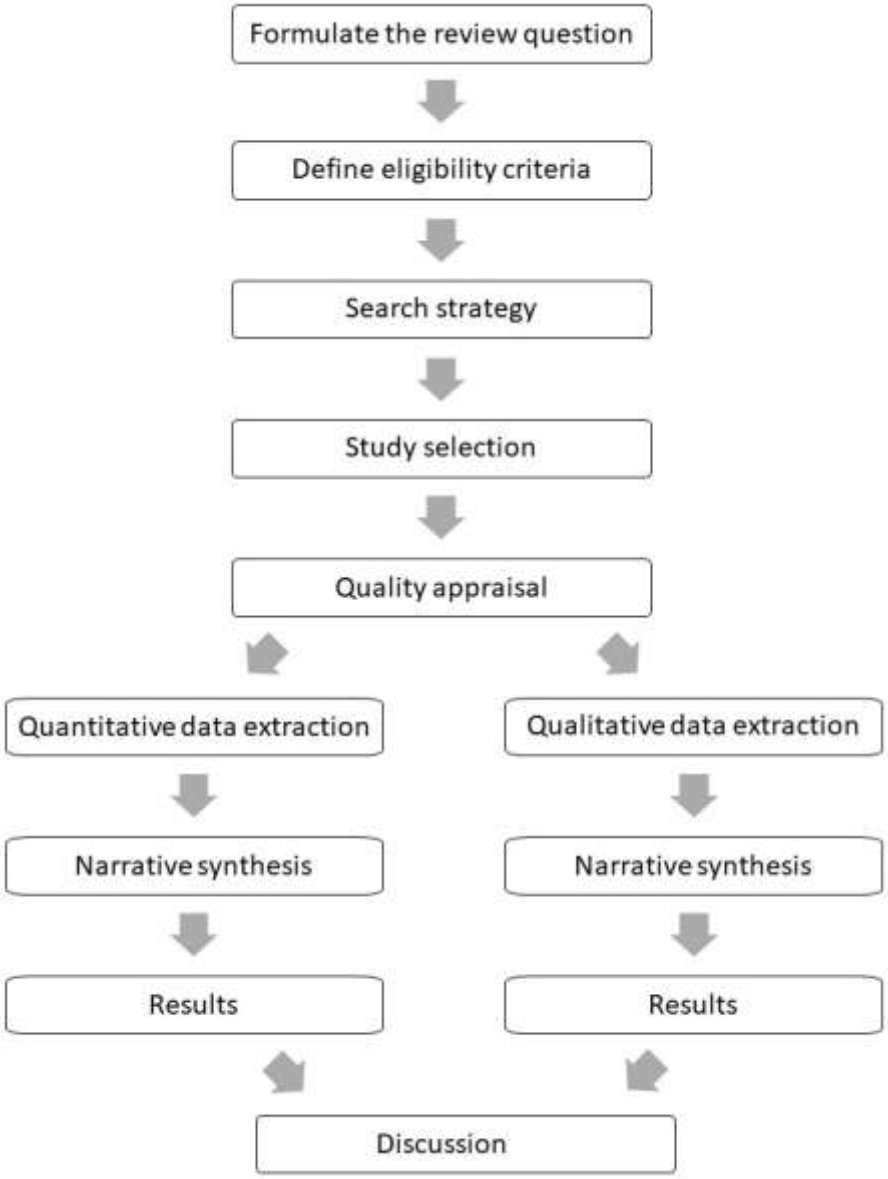

Figure 1: Diagram of procedures for systematic mixed studies review

Eligibility Criteria

Studies will be selected according to the following criteria:

- **Population:** We will include only articles where participants are ambulance staff working within the prehospital care setting. This will encompass both the Anglo-American model and the Franco-German model of emergency medical services so potential eligible professions are paramedics, emergency medical technicians, emergency care assistants, ambulance service managers, emergency call takers, emergency dispatchers, prehospital doctors or prehospital nurses.

- **Intervention:** Feedback provided to emergency ambulance staff i.e. the systematised provision of information to frontline ambulance staff regarding their performance within prehospital practice and/or patient outcomes. This could be any form of feedback including but not limited to clinical performance feedback on an individual, team or service level, patient outcome feedback, peer-to-peer feedback and patient-reported experience feedback. We will exclude articles where feedback is not provided to staff, where the sole focus is automated feedback provided by AEDs, where feedback is based on hypothetical data or where feedback is provided within an educational context rather than professional practice.

- **Comparison:** Having a comparator or control group is not a determinant for inclusion.

- **Outcome:** We are interested in all outcomes e.g. financial outcomes, process-related outcomes, personal outcomes and service level outcomes. This category will be further refined throughout the review.

- **Study type:** This review will include empirical primary research of qualitative, quantitative and mixed-methods methodology published in peer-reviewed journals. Systematic reviews retrieved by the search strategy will also be screened for eligible studies. We will exclude grey literature e.g. letters to the editor, guidelines, dissertations and conference abstracts.

- **Language and date of publication:** No limits will be imposed regarding date of publication or country. Only articles reported in the English language will be included due to a lack of funding for translation.

Information Sources

To identify potentially relevant documents, the following bibliographic databases will be searched from their respective inception dates:

- MEDLINE via Ovid
- Embase via Ovid
- AMED via Ovid
- PsycInfo via Ovid
- HMIC via Ovid

- CINAHL via EBSCO
- Web of Science

The Cochrane Systematic Review Library, Joanna Briggs Institute and PROSPERO will be searched for relevant systematic reviews.

Search Strategy

A three-step search strategy will be utilised:

Step 1: Preliminary searches

Preliminary searches of MEDLINE and Google Scholar were conducted between September-December 2019 to identify exemplar papers, which were then analysed for relevant keywords and index terms.

Step 2: Database search

Using the keywords and index terms identified during Step 1, the databases will be searched utilising a detailed search strategy consisting of three concepts that will be combined using the Boolean operator 'AND': pre-hospital, feedback synonyms and feedback content. Concept A is an amended version of Olaussen *et al.*'s (2017) paramedic literature search filter optimised for sensitivity. Concepts B and C have been influenced by the search strategy used by Ivers *et al.* (2012) in the most recent Cochrane Review on audit and feedback interventions, but have been widened to encompass other types of feedback not associated with audit, as well as performance measures specific to the prehospital setting. The complete search strategy for MEDLINE is represented in Table 2 and has been modified where appropriate for the other databases.

Table 2: Search Strategy for MEDLINE

Concept A: Ambulance Staff	**Concept B: Feedback Synonyms**	**Concept C: Feedback Content**
(Ambulances or "Emergency Medical Technician" or "Air Ambulances" or "Emergency Medical Services" or Triage or Hotlines or "Call Centers" or "Emergency Medical Dispatch").sh. or (Paramedic* or EMS or Prehospital or Pre-hospital or "first responder*" or "emergency medical technician*" or "emergency service*" or Ambulance* or HEMS or "field triage" or "out-of-hospital" or 999 or 911 or 9-1-1 or dispatch* or EMD or "control cent*"	feedback.sh. or (feedback or post?box or debrief* or dashboard* or "clinical safety charts" or "extensive review" or "review sessions" or "follow?up	(Quality Improvement or Quality of Health Care).sh. or ("clinical outcome*" or (chang* adj3 behavio?r) or performance or "quality of care" or conveyance or "quality improvement*" or "service improvement*" or "professional development" or "patient outcome*" or diagnos?s or (quality adj3 ("chest compression*" or CPR or

or "call cent*" or "call handler*" or "call operator*" or "call?taker*" or "emergency operator*" or "telephone triage" or "emergency telecommunication" or TCPR or "emergency communication").tw. or (EMT* not (cancer or gene or tumo?r)).tw.	tool" or "report* back or benchmark* or scorecard* or appraisal* or feedforward).tw.	"cardio?pulmonary resuscitation" or ALS)) or "treatment time*" or "coroners report*" or (adher* adj2 (system* or guideline*)) or "quality data" or decision?making or "patient safety" or well?being or reflection).tw.

Step 3: Reference list searching

To supplement the above preliminary and structured search, the reference lists of all studies included in the review will be examined to conduct forward and backward citation searches.

DATA MANAGEMENT

All titles and abstracts generated by the searches will be downloaded and exported to reference management software (EndNote X9). Duplicates will be removed using the Bramer-method (Bramer *et al.*, 2016). Search results will be imported into the open access online tool CADIMA (Kohl *et al.*, 2018) to conduct screening, data extraction and quality assessment.

Study Records: Selection Process

The full set of titles and abstracts retrieved will be independently screened for eligibility by a single reviewer (CW) in accordance with the above eligibility criteria. This will be conducted in two passes: Firstly, articles will be screened for eligibility under the population criteria and secondly articles will be screened according to the intervention criteria. The population and intervention criteria are hierarchical in nature and can therefore be applied independently at two different stages. This method was chosen as pass 1 will represent a manual check to adjust for error in the electronic database search, whilst pass 2 will allow the reviewer to focus on articles' relevance for the review. A random 10% subsample of articles will be independently screened by a second reviewer (EP) following the same two-pass method. Any disagreements that arise between the two reviewers will be resolved through discussion and by consulting a third reviewer (JB) if required. Cohen's kappa will be calculated to determine the level of agreement between the reviewers for pass 1 and pass 2.

Articles selected for full-text review will be reviewed for eligibility under all the above criteria by a single reviewer (CW). Any articles that meet study design inclusion criteria but which are excluded at this stage on the basis of not fulfilling the population or intervention criteria will be reviewed by a third reviewer (JB) for confirmation of eligibility. Any disagreements will be resolved by discussion or by consulting a fourth reviewer (GJ or RL). A PRISMA flow-chart diagram will be used to report the study selection process.

Data Collection Process and Data Items

Data extraction will be performed using a comprehensive, standardised extraction template that will be tailored to the specific characteristics of this review (see Appendix A). Selection of the data items will be guided by the template for intervention description and replication (TIDieR) checklist (Hoffmann *et al.*, 2014) and complemented by modifiable design elements of feedback interventions suggested in previous systematic reviews within audit and feedback (Ivers *et al.*, 2012; Colquhoun *et al.*, 2017; Brown *et al.*, 2019).

Prior to extracting data, studies will be divided into the following three distinct categories in line with the review questions:

i. Empirical interventional studies of prehospital feedback interventions
ii. Empirical non-interventional studies on prehospital feedback
iii. Remaining interventional and non-interventional studies where prehospital feedback is mentioned but is not the focus of the study

Basic data such as type of feedback, definition of feedback and study outcomes will be extracted for all studies but the remaining data extraction items will vary between the assigned categories. Empirical interventional studies (category i) will have data extracted on the feedback content, provider, receiver, format, mechanisms, frequency and timeliness. Whereby, non-interventional studies (category ii) will have data extracted on current provision, motives and barriers to prehospital feedback. The remaining studies (category iii) will only have basic data extracted, as it is anticipated that these will provide limited detail of prehospital feedback as this is not the studies' focus.

The chosen data items will be piloted on 10% of the included articles by the primary researcher (CW) and may be further refined throughout the data extraction phase. Data extraction will be performed by a single reviewer (CW) with verification by the wider research team (GJ, RL, JB).

If data are incomplete in the study report, attempts will be made to contact study authors via email to obtain clarification. We will allow a delay of 4 weeks to receive a response following two email attempts. Where missing data cannot be acquired, the impact on the quality of the study will be discussed.

Study Quality Appraisal

Individual sources of evidence will be critically appraised using the Mixed Methods Appraisal Tool (MMAT) developed by Hong *et al.* (2018). This tool was chosen as it is a combined tool for assessing quantitative, qualitative and mixed methods studies; thereby, avoiding the use of multiple appraisal tools when confronted with different study designs as is anticipated in this review. The MMAT has been tested for validity and has been used in various systematic mixed studies reviews to evaluate the methodological quality by answering four questions regarding recruitment, randomisation (if applicable), appropriateness of outcome measures and attrition

rate/completeness of data. The final score reflects the number of criteria satisfied, varying from one criterion met (reported as *) to all criteria met (****).

The quality of the generated studies will not define their eligibility, but will inform the validity of our findings. The quality assessment of all included studies will be performed by a single reviewer (CW) with verification by a second reviewer (JB).

Data Synthesis

Given the expected heterogeneity of quantitative data, the evidence will be reported in narrative form for both quantitative and qualitative data. The narrative synthesis will be informed by relevant theories e.g. Behaviour Change Theory (Michie *et al.*, 2011), Feedback Intervention Theory (Kluger and Denisi, 1996) and Clinical Performance Feedback Intervention Theory (Brown *et al.*, 2019).

The narrative synthesis will follow the guidance by Popay *et al.* (2006, p. 12) for narrative synthesis, which consists of four key elements:

1. Developing a theoretical model of how the intervention works, why and for whom
2. Developing a preliminary synthesis
3. Exploring relationships in the data
4. Assessing the robustness of the synthesis product

The proposed synthesis can be described as a parallel-results convergent synthesis design (Hong *et al.*, 2017), which means that data will be extracted and analysed separately for the three previously described categories: empirical interventional studies (category i), empirical non-interventional studies (category ii) and remaining interventional and non-interventional studies where prehospital feedback is not the main focus of the study (category iii). It is likely that studies from category 1 will be analysed using qualitative case descriptions, which is one of the tools and techniques recommended by Popay *et al.* (2006) for exploring relationships between studies in order to build up a composite picture of successful interventions and thereby provide the kind of detail that could be useful for those wanting to design interventions themselves. This technique is also described by Pluye and Hong (2014) using the term 'multiple case synthesis' and builds upon the case survey method proposed by Yin *et al.* (1976).

It is possible that subgroup analyses may be undertaken but it is not possible to specify these groups in advance due to this being a narrative synthesis. NVivo (Version 12 Plus, QSR International) software will be used to support data synthesis. .

Meta-Biases

One of the risks of this review is bias caused by the cumulative effect of publication bias of positive results in empirical studies. We aim to balance this by including qualitative studies, where both positive and negative experiences tend to be expressed. In addition, included

interventional studies will be assessed for reporting bias by searching for a published protocol or registration with a clinical trials registry. Where outcomes are specified in the protocol but not reported in the final report, a risk of bias will be suspected. Lastly, this review is subject to language bias due to only including papers written in English.

Confidence in Cumulative Evidence

There is no approved approach for assessing confidence in findings developed from mixed studies reviews: Grading of Recommendations Assessment Development and Evaluation (GRADE) is used for quantitative evidence and Confidence in the Evidence from Reviews of Qualitative Research (CERQual) for qualitative findings but both these approaches are method-specific and to date there has been no research to explore whether this separate approach is suitable to mixed methods reviews (Lewin *et al.*, 2018). In fact, the Joanna Briggs Institute recommends that neither GRADE or CERQual are used due to the complexities associated with recommendations being derived from both streams of evidence and the potential impact of data transformation and integration on the grading process (Lizarondo *et al.*, 2017). However, this review employs a parallel-results convergent synthesis design, which means results will be collected and analysed separately without the need for transformation or integration of qualitative to quantitative data or vice-versa. Therefore, adaptations of GRADE/CERQual will be used individually for quantative/qualitative studies similar to approaches employed in other mixed studies reviews (Noyes *et al.*, 2019).

CONCLUSION

Our proposed systematic review is designed to comprehensively address the evidence gap surrounding the current types and effects of prehospital feedback, whilst synthesizing the mechanisms and moderators of those effects resulting from the organisational or service context in which the feedback takes place. The review findings will define the current evidence base for future research to build upon and highlight the evidence gaps and potential research questions to be addressed. The research team plans to use the findings to inform a realist review of current practice of prehospital feedback initiatives in the United Kingdom, for example, as well as to evaluate an enhanced prehospital feedback intervention as part of a PhD programme.

In practical terms, the review findings will be useful to guide the development of future prehospital feedback programmes and interventions, for which there is growing interest in the international health services literature. The development of an evidence base for the design of prehospital feedback is all the more important for the enabling effects of both developing electronic health record systems and the accompanying capability for data linkage across organisational and care system boundaries (Porter *et al.*, 2020). Such developments in healthcare informatics may afford important opportunities to develop more effective feedback for prehospital practitioners in the near future.

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ADMINISTRATIVE INFORMATION

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CW drafted the protocol with input and guidance from GJ, RL and JB. CW and JB developed the study design, search strategy, risk of bias assessment strategy and data extraction criteria. All authors have substantially contributed to the study design, selection criteria and development of this protocol. All authors have read, provided feedback and approved the final manuscript.

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Amendments

In the event of protocol amendments, the date of each amendment will be accompanied by a description of the change and the rationale when amending the PROSPERO record.

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Conflict of Interest

None declared.